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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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08/807,737 02/27/97 OHTANI

H 0756-1638

MM42/1004
SIXBEY FRIEDMAN LEEDOM & FERGUSON
2010 CORPORATE RIDGE
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MCLEAN VA 22102

EXAMINER

SULSKY.M

ART UNIT	PAPER NUMBER
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2813

28

DATE MAILED: 10/04/99

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
08/807,737

Applicant(s)

Ohtani et al.

Examiner

Martin Sulsky

Group Art Unit

2813



☒ Responsive to communication(s) filed on Aug 11, 1999

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 19-77 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 19-77 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 23

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims amended to overcome rejections. Rejections withdrawn.

Claim Rejections - 35 USC § 102

2. Claim amended to overcome rejection. "Forming a silicon nitride film containing at least one of hydrogen and oxygen over a substrate" not disclosed by Zhang. Rejection withdrawn.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 29-39,42,43,46,47,54-59,66-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang (US 5,403,772) in view of Masumo (US 5,306,651).

Zhang discloses a method of manufacturing a semiconductor device which comprises depositing amorphous silicon, 200-3000 Å, on an insulating substrate (col 12, lines 12-19), depositing a nickel catalyst film in contact with said amorphous layer including a embodiment with selective deposition and lateral crystal growth (embodiment 4, figure 7A-7E), an embodiment with a silicon nitride coating layer while crystallizing (col 8, lines 11-15, embodiment 5), heated to crystallize said amorphous silicon (col 17, lines 58-60), improving the

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crystallinity by irradiating with visible or near infrared light and patterning the crystallized silicon layer to form the active region of a TFT (col 17, lines 65-68). However, the reference does not teach forming a silicon nitride film containing at least one of hydrogen and oxygen over a substrate.

Masumo (US 5,306,651) teaches that SiO_x , SiN_x and SiO_xN_y are art recognized equivalents for being a passivation layer on a silicon substrate.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of Zhang to use SiO_xN_y in place of SiO_x for the passivation layer because Masumo teaches that SiO_x , SiN_x and SiO_xN_y are art recognized equivalents for being a passivation layer on a silicon substrate.

As explicitly taught in pages 2 and 3 of the specification of the instant application and further acknowledged in applicants response in paper number 20, crystallizing amorphous silicon in contact with silicon nitride inherently causes crystallization in a non(111) orientation. Also, it is held, absent evidence to the contrary, that radiation in the visible to near infrared region in inherently encompasses wavelengths from .6 to 4 μm . See In re Swinhart, 169 USPQ 226,229 (CCPA 1971) (where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that subject matter shown to be in the prior art does not possess the characteristics relied on) and In re Fitzgerald, 205 USPQ 594 (CCPA 1980) (the burden of proof can be shifted to the applicant to

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show that subject matter of the prior art does not possess the characteristic relied on whether the rejection is based on inherency under 35 USC 102 or obviousness under 35 USC 103).

Zhang does not disclose the use of a halogen lamp to generate said visible or infrared light or a heating rate of 50 to 200 °C/s.

The examiner takes official notice that the use of halogen lamps to generate visible and infrared light was well known in the art at the time of the invention and that this feature is disclosed in the prior art of record. While the '772 reference is silent as to the heating rate, the specification of the instant application does not disclose an criticality associated with the claimed rate. The selection of heating rate is therefore a matter of routine optimization. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and In re Aller, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

5. Claims 19-28, 40, 41, 44, 45, 48-53, 60-65, 72-77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki (US 5,773,327) or Takayama (US 5,843,225) or Yamazaki (US 5,639,698) in view of Masumo (US 5,306,651).

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The references disclose methods of manufacturing a semiconductor device which comprise depositing amorphous silicon, 500-1500Å, on an insulating substrate (Embodiment 1 all three references), disposing a solution containing a nickel catalyst in contact with said amorphous silicon (US '327 embodiment 4, US '225 Example 6, US '698 Example 4) including selective depositing of catalyst with lateral crystallization (US '327 col 8, lines 8-13, US '225 ,Figure 9A US '698 col 12, lines 1-17), heating said amorphous silicon to crystallize (US '327 embodiment 4, US '225 example 6, US '698 Example 4), irradiating with infrared light to improve crystallinity (US '327 col 6, lines 50-53, US '225 col 12, lines 46-49, US '698 col 10, lines 13-18) and patterning to form the active region of a TFT (US '327 embodiment 4, US '225 Example 6, US '698 Example 4). However, the references do not teach forming a silicon nitride film containing at least one of hydrogen and oxygen over a substrate.

Masumo (US 5,306,651) teaches that SiO_x , SiN_x and SiO_xN_y are art recognized equivalents for being a passivation layer on a silicon substrate.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to to modify the process of Zhang to use SiO_xN_y in place of SiO_x for the passivation layer because Masumo teaches that SiO_x , SiN_x and SiO_xN_y are art recognized equivalents for being a passivation layer on a silicon substrate.

Double Patenting

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6. Claims 19-77 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of U.S. Patent No. 5,605,846 in view of Masumo (US 5,306,651) and in further view of Sze (VLSI Technology).

Masumo (US 5,306,651) teaches that SiO_x , SiN_x and SiO_xN_y are art recognized equivalents for being a passivation layer on a silicon substrate. Further, Sze (pages 266-267) teaches that by adjusting the ratio of the reactants, any film composition between SiO_2 , Si_3N_4 can be obtained and that this is beneficial.

Response to Arguments

7. Applicant's arguments with respect to claims 1-77 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Vossen and Kern (Thin Film Processes II) - teaches that plasma CVD silicon nitride films inherently contain hydrogen.

Ghandi (VLSI Fabrication Principles) - teaches the use of silicon oxynitride films.

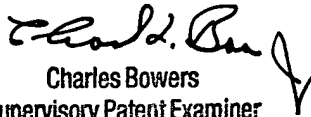
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Note Size (VLSI Technology), already of record, teaches that plasma CVD silicon nitride films inherently contain hydrogen.

9. Any inquiry concerning this communication from examiner should be directed to Martin Sulsky whose telephone number is (703) 305-0129. The examiner can normally be reached by telephone on Monday to Thursday 6:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Bowers, can be reached on (703) 308-2417. The fax phone number for the group is (703) 308-7722.

MS


Charles Bowers
Supervisory Patent Examiner
Technology Center 2800

September 28, 1999